

Having thus described the invention, it is claimed:

- Sub 5 A
1. A solvent-resin composition having generally zero volatile organic compounds (VOCs), the composition consisting essentially of a resin component and a solvent component; the solvent component being 5-95% by total volume of the solvent-resin composition, the solvent component being one or more of the zero-VOC solvents selected from the group consisting of:
- 1) chlorobromomethane;
 - 2) 1-bromopropane;
 - 3) methyl acetate;
 - 4) n-alkane (C12-C18);
 - 5) t-butyl acetate;
 - 6) perchloroethylene;
 - 7) benzotrifluoride;
 - 8) parachlorobenzotrifluoride
 - 9) acetone;
 - 10) 1,2-dichloro-1,1,2-trifluoroethane
 - 11) dimethoxymethane;
 - 12) 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane;
 - 13) 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane;
 - 14) 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane;
 - 15) 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane;
 - 16) methylene chloride; and,
 - 17) technical white oils (mineral oils).

- ② 2. The composition according to claim 1 wherein the solvent component is present in the amount 40-95% by total volume of the composition.

③ 3. The composition according to claim 2 for use as an adhesive wherein the solvent component is present in the amount 30%-80% by total volume of the composition.

④ 4. The composition according to claim 2 for use as an ink wherein the solvent component is present in the amount 70%-95% by total volume of the composition.

Sub A 5. The composition according to claim 1 wherein the solvent component is present in the amount 10-90%, by total volume of the composition, and a portion of the solvent component is selected from the group consisting of:

chlorobromomethane;
1-bromopropane;
methyl acetate;
n-alkane (C12-C18);
t-butyl acetate;
perchloroethylene;
benzotrifluoride;
parachlorobenzotrifluoride;
acetone;
1,2-dichloro-1,1,2-trifluoroethane;
dimethoxymethane; and/or
methylene chloride.

6. The composition according to claim 1 wherein the resin component includes methyl acetate, wherein the solvent component is present in the amount 10-95% by total volume, and wherein, at least a portion of the solvent component is selected from the group consisting of:

chlorobromomethane;
1-bromopropane;
n-alkane (C12-C18);
t-butyl acetate;
perchloroethylene;

benzotrifluoride;
parachlorobenzotrifluoride;
acetone;
1,2-dichloro-1,1,2-trifluoroethane;
15 dimethoxymethane;
1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-
butane;
2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-
heptafluoropropane;
20 1-ethoxy-1,1,2,2,3,3,4,4,4-
nonafluorobutane; and,
2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-
heptafluoropropane.

7. The composition according to claim 1 wherein at
least a portion of the solvent component, expressed in
terms of % by total volume of the at least a portion of
the solvent component, is selected from the group
5 consisting of:

(1) 10-90% benzotrifluoride and 10-90% of one or
more of the solvents:

(a) 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-
butane;

10 (b) 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-
heptafluoropropane;

(c) 1-ethoxy-1,1,2,2,3,3,4,4,4-
nonafluorobutane;

15 (d) 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-
heptafluoropropane;

(e) perchloroethylene;

(f) 1-bromopropane;

(g) acetone;

(h) n-alkane (C12-C16);

20 (i) t-butyl acetate (C12-C16); and,

(j) parachlorobenzotrifluoride;

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- (2) 5-20% benzotrifluoride and 80-95% 1-bromopropane;
- (3) 10-90% acetone and 10-90% n-alkane (C12-C18);
- (4) 10-90% 1-bromopropane and 10-90% of one or more of:
- (a) chlorobromomethane; and,
- (b) n-alkane (C12-C18);
- (5) 10-90% parachlorobenzotrifluoride and 10-90% of one or more of:
- (a) 1-bromopropane;
- (b) chlorobromomethane;
- (c) t-butyl acetate; and,
- (d) n-alkane (C12-C18);
- (6) 10-90% 1,2-dichloro-1,1,1-trifluoroethane and 10-90% of one or more of:
- 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane;
- 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane;
- 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane;
- and,
- 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane;
- 1-bromopropane
- acetone;
- benzotrifluoride; and,
- methyl acetate.

- ⑧ 8. The composition according to claim 1 wherein the solvent component consists essentially of 10-90% methylene chloride and 10-90% of one or more of the solvents selected from the group consisting of:

chlorobromomethane;

1-bromopropane;

methyl acetate;

n-alkane (C12-C18);

t-butyl acetate;

10 perchloroethylene;
benzotrifluoride;
parachlorobenzotrifluoride;
acetone;
1,2-dichloro-1,1,2-trifluoroethane; and,
15 dimethoxymethane.

Sub A3 9. The composition according to claim 1 for use as
an adhesive wherein the solvent component is 40-90% by
total volume of the composition of 1-bromopropane.

10. The composition according to claim 1 for use as
a blowing agent wherein the solvent component consists
essentially of:

5 99-99.98%, by total volume of the solvent
component, 1,2-dichloro-1,1,1-trifluoroethane and

0.01-0.5%, by total volume of the solvent
component, alpha-methyl styrene to inhibit polymerization.

Sub A 11. The composition according to claim 1 further
consisting essentially of, approximately 40-95%, by total
volume of the composition, 1-bromopropane, and
5 approximately 5-60% of one or more of resins selected from
the group of acrylic, epoxy, urethane, nitrocellulose,
styrene, polyvinyl chloride and polychloroprene.

Sub A4 12. The composition according to claim 11 further
consisting essentially of approximately 70-95%, by total
volume of the composition, 1-bromopropane, and
5 approximately 5-30% of one or more of resins selected from
the group of acrylic, epoxy, urethane, nitrocellulose,
styrene, polyvinyl chloride and polychloroprene.

13. The composition according to claim 1 further
consisting essentially of approximately 50-90%, by volume,

1-bromopropane, and 10-30% of one or more of resins selected from the group of acrylic polymer and urethane polymer.

14. The composition according to claim 1 further consisting essentially of approximately 45-85%, by volume, of 1-bromopropane, and 10-30% of acrylic polymer or urethane polymer, and 5-10%, by volume, acetone to improve solubility if necessary.

15. The composition according to claim 1 further consisting essentially of approximately 40-90%, by total volume of the composition, of 1-bromopropane, approximately 5-35% of a hydrocarbon resin, and approximately 5-25% of a resin, at least a portion of the resin being selected from the group of styrene-butadiene, polychloroprene, polyvinyl chloride, acrylic, epoxy, urethane, nitrocellulose, or styrene.

16. The composition according to claim 1 wherein the a portion of the hydrocarbon resin is selected from the group of olefin, rosin ester and terpene.

17. The composition according to claim 1 further consisting essentially of approximately:

70-90%, by volume, 1,2-dichloro-1,1,1-trifluoroethane;

9-29% dimethoxymethane; and,

0.5% butylene oxide and 0.5% nitromethane to stabilize the composition.

18. The composition according to claim 1 wherein approximately 5-10% by volume acetone is added to the composition to improve solubility as necessary.

① 17 19. The composition according to claim 1 wherein the solvent component, expressed in terms of % by total volume of the composition, consists essentially of 1-20% technical white oil and 10-90% of one or more solvents selected from the group consisting of:

- (1) n-alkane (C12-C18);
- (2) methyl acetate;
- (3) t-butyl acetate;
- (4) benzotrifluoride;
- 10 (5) acetone;
- (6) parachlorobenzotrifluoride;
- (7) parachlorobenzotrifluoride;
- (8) perchloroethylene; and,
- (9) methylene chloride; and,
- 15 (10) a mixture of methylene chloride, acetone, t-butyl acetate, methyl acetate and perchloroethylene;

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① 18 20. The composition according to claim 17 wherein the solvent component, expressed in terms of % by total volume of the composition, consists essentially of 1-20% technical white oil and 10-90% of one or more of: methylene chloride; acetone; t-butyl acetate; methyl acetate; and, perchloroethylene;

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Sub 16 21. A resin-solvent composition for use as an adhesive comprising approximately:

- 40-90%, by total volume of the composition, of one or more of 1-bromopropane and benzotrifluoride,
- 5-35% of a hydrocarbon resin as a tackifier, and
- 5-25% of a resin, at least a portion of the resin being selected from the group of styrene-butadiene, polychloroprene, polyvinyl chloride, acrylic, epoxy,
- 15 urethane, nitrocellulose, and styrene.

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(23) 23. The composition according to claim 22 wherein at least a portion of the hydrocarbon resin is selected from the group of olefin, rosin ester and terpene.

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(24) 24. A composition for use as a blowing agent in the manufacture of resin foams, the composition comprising ~~approximately~~, by total weight of the composition:

50-70% polyether triol;

20-40% of one or more of toluene diisocyanate and toluene disocyanurate;

0-5% catalyst;

0-5% surfactant;

0-10% water; and,

2-15% of one or more of: 1-bromopropane; chlorobromomethane, ~~1,2-dichloro-1,1,1-trifluoroethane~~.

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(25) 25. The composition according to claim ²⁴24 wherein: the polyether triol is present in the amount 60-65%;

5 the one or more of toluene diisocyanate and toluene disocyanurate is present in the amount of 30-33%;

the water is present in the amount of 1-2%;

the catalyst is present in the amount of 0.09-2%;

10 the surfactant is present in the amount of 0.3-1.5%; and,

the one or more of 1-bromopropane and chlorobromomethane is present in the amount of 2.4-6.1%.

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(26) 26. A cleaning composition ^{consisting essentially of} ~~having generally~~ zero volatile organic compounds (VOCs), the composition consisting essentially of one or more of the zero-VOC solvents selected from the group consisting of:

5 chlorobromomethane;

1-bromopropane;

10 n-alkane (C12-C18);
t-butyl acetate;
perchloroethylene;
benzotrifluoride;
parachlorobenzotrifluoride;
acetone;
1,2-dichloro-1,1,2-trifluoroethane;
dimethoxymethane;
15 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-
butane;
2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-
heptafluoropropane;
1 - e t h o x y - 1 , 1 , 2 , 2 , 3 , 3 , 4 , 4 , 4 -
20 nonafluorobutane; and,
2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-
heptafluoropropane.

26. The cleaning composition of claim ²⁶~~25~~ wherein the one or more solvents, expressed in terms of total volume of the composition, is selected from the group consisting of:

- 5 (1) 10-90% benzotrifluoride and 10-90% of one or more of the solvents:
- (a) 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxybutane;
- 10 (b) 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane;
- (c) 1 - e t h o x y - 1 , 1 , 2 , 2 , 3 , 3 , 4 , 4 , 4 - nonafluorobutane;
- (d) 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane;
- 15 (e) perchloroethylene;
- (f) 1-bromopropane;
- (g) acetone;
- (h) n-alkane (C12-C16);
- (i) t-butyl acetate (C12-C16); and,

- 20 (j) parachlorobenzotrifluoride;
- (2) 5-20% benzotrifluoride and 80-95% 1-bromopropane;
- (3) 10-90% acetone and 10-90% n-alkane (C12-C18);
- (4) 10-90% 1-bromopropane and 10-90% of one or more
- 25 of:
- (a) chlorobromomethane; and,
- (b) n-alkane (C12-C18);
- (5) 10-90% parachlorobenzotrifluoride and 10-90% of one or more of:
- 30 (a) 1-bromopropane;
- (b) chlorobromomethane;
- (c) t-butyl acetate; and,
- (d) n-alkane (C12-C18);
- (6) 10-90% 1,2-dichloro-1,1,1-trifluoroethane and
- 35 10-90% of one or more of:
- 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane;
- 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane;
- 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane;
- 40 and,
- 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane;
- 1-bromopropane
- acetone;
- 45 benzotrifluoride; and,
- methyl acetate.

Add
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